Preliminary Draft

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NIC #
Packet Radio Temporary Note #

Here is a synopsis of the technique I propose we adopt for the modem signalling. The intent is to decrease drastically the amount of sidelobe interference at the output of a matched filter due to overlapping signals.

Instead of sending a single spread spectrum signal, we shall send two signals in separate bands. (For the moment, consider them to be adjacent.) Let us call these signals $S_0(t)$ and $S_1(t)$ respectively. Let $S_0(t)$ be one spread spectrum signal, let $S_1(t)$ be a second spread spectrum signal which has a main lobe essentially identical to $S_0(t)$ and sidelobes opposite in sign. On reception the two signals are individually matched filter deleted and then added together to cancel the sidelobes.

One way to approximate such a pair of signals is by using complementary codes. For example, the two sequences

+ + + -

+ + - +

are complementary since their descrete autocorrelation functions are given by

- 1, 0, 1, 4, 1, 0, -1

1, 0, -1, 4, -1, 0, 1

adding these two discrete signals gives

0, 0, 0, 8, 0, 0, 0

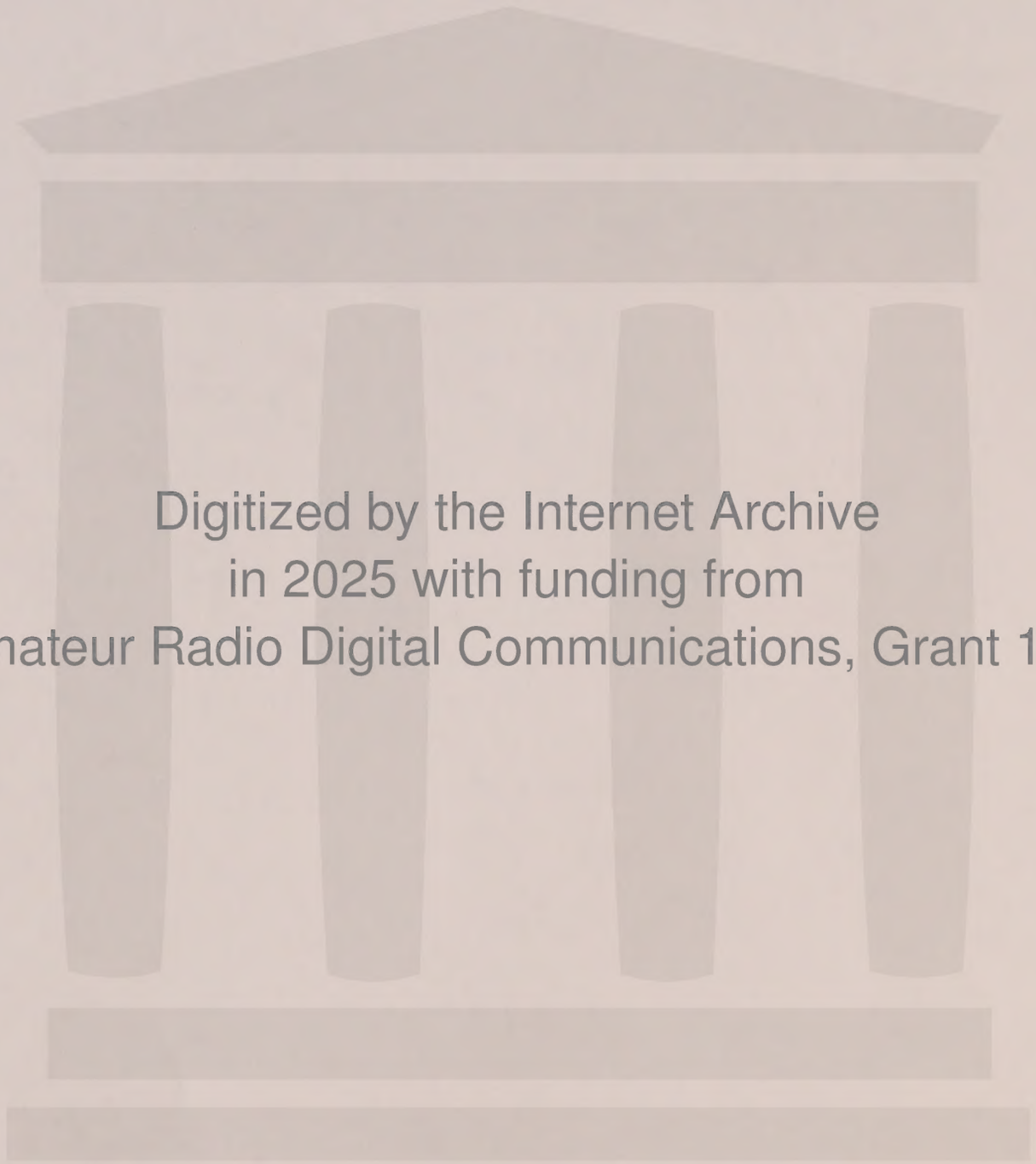
other examples are given by the sequence pairs

+ + + - + + - +

+ + + - - - + -

+ + + - + + - + + + + - - - + +

+ + + - + + - + - - - + + + - +



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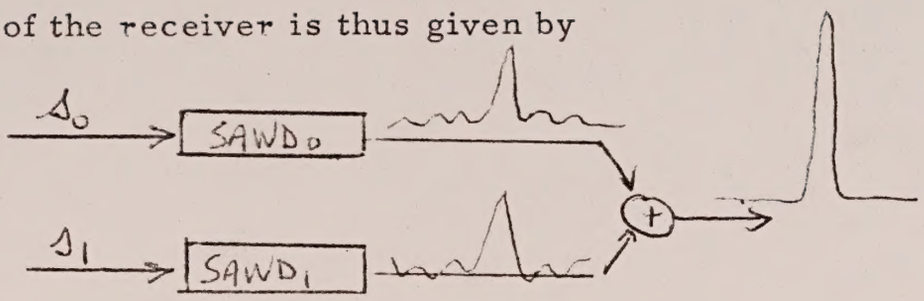
and the structure of the receiver is thus given by



This appears to be less desireable than splitting the demand. The two signals could also be sent sequentially over a single channel. Since a complete separation of S_0 from SAWD1 and S_1 from SAND$_0$ would not be as straightforward, and some extra buffering would be required.

If N matched filters are used, it is possible to generate N independent pairs of signals; thus we need not lose efficiency on the channel. However, I am only proposing we consider one sequence pair for the two receivers at this time.

A more detailed description of this technique is in preparation and will be distributed. The closest approach to this method I know of was a radar ranging technique used several years ago at Lincoln Lab called "Long Range Demonstration Radar." I will try to get a description of that system for distribution.